

Lin Liu, Ph.D.
Regents Professor of Physiological Sciences
Lundberg-Kienlen Endowed Chair in Biomedical Research
Director, Oklahoma Center for Respiratory and Infectious Diseases
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Oklahoma State University-Stillwater



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Office: 210 McElroy Hall, Stillwater, OK 74078

Education:

1984: B.S., Chemistry, University of Science & Technology of China

1989: Ph.D., Biochemistry, Shanghai Institute of Biochemistry, Chinese Academy of Sciences

1991: Postdoc, Biochemistry, Dept of Biochem and Biophys, University of Pennsylvania Med Center

1992: Postdoc, Lung Biology, Institute For Environmental Med, University of Pennsylvania Med Center

Academic Appointments:

1992-1995: Research Associate, Institute for Environmental Medicine, University of Pennsylvania

1995-1997: Associate Investigator, Institute for Environmental Medicine, University of Pennsylvania

1997-2000: Research Assistant Professor, Department of Physiology, East Carolina University

2000-2004: Associate Professor, Department of Physiological Sciences, Center for Veterinary Health Sciences (CVHS), Oklahoma State University (OSU)

2004-present: Professor, Department of Physiological Sciences, CVHS, OSU

2008-present: Lundberg-Kienlen Professor/Chair in Biomedical Research, CVHS, OSU

2009-present: Regents Professor, OSU

2000-present: Director, (Lundberg-Kienlen) Lung Biology and Toxicology Lab, OSU

2010-2013: Riata Entrepreneurship Faculty Fellow, School of Entrepreneurship, OSU

2014-present: Director, Oklahoma Center for Respiratory and Infectious Diseases

Research Interests:

Host factors and influenza virus and bacterial infections; stem cell-based therapy; lung development, injury and repair; microRNAs; and pulmonary diseases (COPD, IPF, ARDS and BPD).

Awards and Honors:

1992: Natural Science Award of Chinese Academy of Science

1998: FASEB MARC SRC Scholarship Award

2004, 2009: Pfizer Award for Research Excellence

2006: Regents Distinguished Research Award, Oklahoma State University

Other Experience and Professional Memberships:

1994-present: American Association for the Advancement of Science

2003–present: American Physiological Society

2008–2011: Member of the Steering Committee for the Physiological Genomics (PG) Interest Group of the American Physiological Society

2000: Managing Editor of *Frontier in Biosciences*

2003-2006: Editorial Board of *Annexins*

2009: Chair, Graduate Student Highlights in Physiological Genomics, Experimental Biology

2010: Chair, Trainee Highlights in Physiological Genomics, Experimental Biology

Ad hoc Reviewers of Grants:

1998: Department of Veterans Affairs Merit Review

2000: NIH, Lung Biology and Pathology (LBPA) Study Section

2005: NIH, Lung Cellular, Molecular, and Immunobiology (LCMI) study section

2005: USDA National Research Initiative Competitive Grant Program

2005: NIH/NIBIB Program Project Special Emphasis Panel

2006: NIH/NHLBI PPG Review Committee (x3)

2006: NIH/NIGMS Minority Biomedical Research Support (MBRS) review committee

2007: NIH, Respiratory Integrative Biology and Translational Research (RIBT) Study Section

2007: Austrian Genome Research Programme GEN-AU

2008, 2009: The Wellcome Trust, Physiological Sciences Grants

2008, 2014: NIH, Lung Injury, Repair and Remodeling (LIRR) Study Section

2010: Raine Medical Research Foundation, Australia

2012: American Heart Association, Lung-Basic Science-2 committee

2013: National Natural Science Foundation of China (NSFC), Lung Disease Study Section

2014: United States-Israel Binational Science Foundation

Research Funding:

Current (~12.9M):

2013-2018: NIH P20GM103648, “Oklahoma Center for Respiratory and Infectious Diseases”, Role: PI, \$11,231,206.

2013-2017: NIH R01HL116876, “miR-101 Control of Pulmonary Fibrosis”, Role: PI, \$1,434,655.

2013-2014: OSU Office of the Provost, “Interdisciplinary Program in Regenerative Medicine at OSU”, Role: PI, \$34,900.

2011-2014: American Heart Association, Southwest Affiliate, “Regulation of VAMP-2 in Alveolar Type II Cells by MicroRNA-206”, Role: PI, \$130,000 (NCE).

2013-2014: Research Advisory Committee, CVHS, OSU, “Regulation of Influenza Virus Replication”, Role: PI, \$15,000.

2012-2014: Technology Business Development Program (TBDP), OSU, “MicroRNA Technology”, Role: PI, \$20,000

Past (selected from 28, ~9.5 M)

2011-2012: Oklahoma Center for Adult Stem Cell Research, “A Shared Equipment for Creating a Lung Disease Model to Test Efficacy of Adult Stem Cell therapy”, Role: PI, \$42,560

2010-2011: Oklahoma Center for Adult Stem Cell Research, “Purchase of Shared Equipment for Testing Efficacy of Adult Stem Cell therapy”, Role: PI, \$62,638

2010-2013: Oklahoma Center for Adult Stem Cell Research, “Reprogramming of Adult Lung Cells for Cell-based Therapy”, Role: PI, \$257,600

2010-2012: Oklahoma Center for the Advancement of Science and Technology, “Development of MicroRNA Expression Library”, Role: PI, \$90,000

2009-2012: NIH/NHLBI R21 “Role of MicroRNAs in Bronchopulmonary Dysplasia”, Role: PI, \$402,600

2009-2012: NIH/NHLBI R03, “MicroRNA Expression Profiling in Idiopathic Pulmonary Fibrosis”, Role: PI, \$147,700

2009-2012: U.S. Department of Agriculture, “MicroRNAs and bovine respiratory disease”, Role: PI, \$225,000

2006-2011: NIH/NHLBI, R01 “Mechanisms of Alveolar Fluid Transport”, Role: PI, \$1,423,125.

2003-2008: NIH/NHLBI, R01 “Mechanisms of Alveolar Epithelial Cell Differentiation”, Role: PI, \$1,214,400

2003-2008: March of Dimes Birth Defects Foundation, “GABA receptor and pulmonary fluid transport”, Role: PI, \$258,075.

2004-2008: NIH/NHLBI, R01 “Molecular Mechanisms of Lung Surfactant Secretion”, Role: PI, \$1,214,400

2002-2004: American Heart Association, Heartland Affiliate, “Lung Epithelial Cell Differentiation and Oxidative Stress”, Role: PI, \$110,000

2001-2004: Oklahoma Center for the Advancement of Science and Technology, “Regulation of Lung Surfactant Secretion by Nitric Oxide”, \$135,000.

2000-2004: NIH/NHLBI, R01 “Molecular Mechanisms of Lung Surfactant Secretion”, Role: PI, \$922,829

1995-2000: NIH/NHLBI R29, “Annexins and Lung Surfactant Secretion”, Role: PI, \$485,772

1993-1995: American Lung Association, “Proteolytic Modification of Annexins and Its Role in Exocytosis”, \$50,000

Publications (selected from 81):

1. **Liu, L.**, Lloyd, P., and Hinsdale, M. (2014) Lung Development in “*MicroRNA in Regenerative Medicine*” (book chapter, Sen, C. eds), in press.
2. Wang Y., Huang, C., Chintagari, N. R., Bhaskaran, M., Huang, C., Weng, T., Guo, Y. and **Liu, L.** (2013) miR-375 regulates alveolar epithelial cell trans-differentiation by inhibiting Wnt/ β -catenin pathway. *Nucleic. Acids Res.* 41:3833-44. PMID: PMC3616718.
3. Kang, K., Peng, X., Zhang, X., Wang, Y., Zhang, L., Gao, L., Weng, T., Zhang, H., Ramchandran, R., Raj, J. U., Gou, D., and **Liu, L.** (2013) MicroRNA-124 suppresses the transactivation of nuclear factor of activated T cells by targeting multiple genes and inhibits the proliferation of pulmonary artery smooth muscle cells. *J. Biol. Chem.* 288:25414-25427. PMID: PMC3757204.
4. Luo, J., Zhao, Q., Zhang, L., Qiu, Z., **Liu, L.**, Chen, J., Zeng, H., Huang, Y., Tan, Y., Yang, L., Zhang, Y., Yang, X., Liu, W., Wang, L., and Shu, W. (2013) The consumption of low-mineral bottled water increases the risk of cardiovascular disease: An experimental study of rabbits and young men. *Int J. Cardiol.* 168:4454-4456.
5. Bhaskaran, M., Xi, D., Wang, Y., Huang, C. Narasaraju, T., Shu, W., Zhao, C. Xiao, X., More, S., Breshears, M. and **Liu, L.** (2012) Identification of microRNAs changed in the neonatal lungs in response to hyperoxia exposure. *Physiol. Genomics* 44:970-980. PMID: PMC3472467.
6. Chintagari, N. R. and **Liu, L.** (2012) GABA receptor ameliorates ventilator-induced lung injury in rats by improving alveolar fluid clearance. *Critical Care* 16:R55.
7. Mishra, A., Chintagari, N. R., Guo, Y., Weng, T., Su, L., and **Liu, L.** (2011) Purinergic P2X7 receptor regulates lung surfactant secretion in a paracrine manner. *J. Cell Sci.* 124:657-668. PMID: PMC 3031375.

8. Chintagari, N. R., Jin, N., Gao, L., Wang, Y., Xi, D., and **Liu, L.** (2010) Role of GABA receptors in fetal lung development in rats. *PLoS One*. 5:e14171. PMID: PMC2994757.
9. Chintagari, N. R., Mishra, A., Su, L., Ayalew, S., Hartson, H. and **Liu, L.** (2010) Vacuolar ATPase regulates surfactant secretion in rat alveolar type II cells by modulating lamellar body calcium. *PLoS One* 5: e9228. PMID: PMC 2821907.
10. Weng, T., Gao, L., Bhaskaran, M., Guo, Y., Gou, D., Narayanaperumal, J., Chintagari, N. R., Zhang, K. and **Liu, L.** (2009) Pleiotrophin regulates lung epithelial cell proliferation and differentiation via β -catenin and Dlk1. *J. Biol. Chem.* 284: 28021-28032. PMID: PMC 2788854.
11. Yang, C. X., Su, L., Wang, Y., and **Liu, L.** (2009) UTP regulation of ion transport in alveolar epithelial cells involves distinct mechanisms. *Am. J. Physiol. Lung Cell. Mol. Physiol.* 297: L439-L454. PMID: PMC 2739774.
12. Bhaskaran*, M., Wang*, Y., Zhang, H., Weng, T., Baviskar, P., Guo, Y., Gou, D. and **Liu, L.** (2009) MicroRNA-127 modulates fetal lung development. *Physiol. Genomics.* 37:268-278. PMID: PMC 2685501 (*co-first author) (selected for highlighting in the newsletter of the journal Physiological Genomics; Highlights from the Literature in Physiology 24:206, 2009).
13. Gou, D., Mishra, A., Weng, T., Su, L., Chintagari, N. R., Wang, Z., Zhang, H., Gao, L., Wang, P., Stricker, H. M. and **Liu, L.** (2008) Annexin A2 interactions with Rab14 in alveolar type II cells. *J. Biol. Chem.* 283: 13156-13164. PMID: PMC 2442313.
14. Posey, T., Weng, T., Chen, Z., Chintagari, N.R., Wang, P., Jin, N., Stricker, H. and **Liu, L.** (2008) Arsenic-induced changes in the gene expression of lung epithelial L2 Cells: implications in carcinogenesis. *BMC Genomics* 9:115. PMID: PMC 22922705.
15. Wang, P., Chintagari, N. R., Narayanaperumal, J., Ayalew, S., Hartson, H., and **Liu, L.** (2008) Proteomic analysis of lamellar bodies isolated from rat lung. *BMC Cell Biol.* 9:34. PMID: PMC2459160. (Faculty of 1000 Biology: evaluations for Wang P et al *BMC Cell Biol* 2008 9 :34 <http://www.f1000biology.com/article/id/1120385/evaluation>).
16. Chintagari, N. R., Gou, D. and **Liu, L.** (2008) Knockdown of flotillin-2 inhibits lung surfactant secretion by alveolar type 2 cells. *Cell Res.* 18:701-703. PMID: 2430057.
17. Gou, D., Zhang, H., Baviskar, P. S. and **Liu, L.** (2007) Primer extension-based method for the generation of a siRNA/miRNA. *Physiol. Genomics.* 31: 554-562.
18. Chen, Z., Chintagari, N.R., Guo, Y., Bhaskaran, M., Chen, J. W., Gao, L., Jin, N., Weng, T. and **Liu, L.** (2007) Gene expression profiles of rat alveolar type II cells during hyperoxia exposure and early recovery. *Free Radic. Biol. Med.* 43: 628-642. PMID: PMC 2075096
19. Wang, P., Chintagari, N.R., Gou, D., Su, L. and **Liu, L.** (2007) Physical and functional interactions of SNAP-23 with Annexin A2. *Am. J. Respir. Cell Mol. Biol.* 37: 467-476. PMID: PMC 2176122.
20. Wang, Y., Weng, T., Gou, D., Chen, Z., Chintagari, N.R. and **Liu, L.** (2007) Identification of rat lung-specific microRNAs by microRNA microarray: valuable discoveries for the facilitation of lung research. *BMC Genomics.* 8:29. PMID: PMC1790902.
21. Bhaskaran, M., Kolliputi, N., Wang, Y., Gou, D., Chintagari, N. R. and **Liu, L.** (2007) Trans-differentiation of alveolar epithelial type II cells to type I cells involves autocrine signaling by TGF- β 1 through the smad pathway, *J. Biol. Chem.* 282:3968-3976.
22. Gou, D., Weng, T., Wang, Y., Wang, Z., Zhang, H., Gao, L., Chen, Z., Wang, P. and **Liu, L.** (2007) A new approach for the construction of multiple shRNA expression vectors. *J. Gene Med.* 9:751-763. (Featured in this issue, <http://www3.interscience.wiley.com/cgi-bin/fulltext/115805811/HTMLSTART>)
23. Jin, N., Kolliputi, N., Gou, D., Weng, T. and **Liu, L.** (2006). A novel function of ionotropic γ -aminobutyric acids receptors involving alveolar fluid homeostasis. *J. Biol. Chem.*, 281:36012-36021.

24. Weng, T., Chen, Z., Jin, N., Gao, L. and **Liu, L.** (2006) Gene expression profiling identifies regulatory pathways involved in the late stage of rat lung development. *Am. J. Physiol. Lung Cell. Mol. Physiol.* 191:L1027-L1037.
25. Chen*, J. W., Chen*, Z., Chintagari, N. R., Bhaskaran, M., Jin, N., Narasaraju, T. A. and **Liu, L.** (2006) Alveolar type I cells protect lung epithelium from oxidative injury. *J. Physiol.* 572: 625-638. PMID: PMC177994 (see comment for this paper, [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=16543260&query_hl=6&itool=pubmed_docsum\[/url\]](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=16543260&query_hl=6&itool=pubmed_docsum[/url]))) (see press release for this paper: http://www.eurekalert.org/pub_releases/2006-05/bpl-ati050506.php). (*co-first author).
26. Jin, N. He, K. and **Liu, L.** (2006) qPCR-DAMS: a database tool to analyze, manage, and store both relative and absolute real time PCR data. *Physiol. Genomics*, 25:525-527.
27. Chintagari, N. R., Jin, N., Wang, P., Narasaraju, T., Chen, J. and **Liu, L.** (2006) Effect of cholesterol on the exocytosis of alveolar type II cells. *Am. J. Respir. Cell. Mol. Biol.* 34: 677-687. PMID: PMC2644229.
28. Chen, Z., Chen, J. W., Weng, T., Jin, N. and **Liu, L.** (2006) Identification of rat lung-prominent genes by a parallel DNA microarray hybridization. *BMC Genomics*, 7:47. PMID: PMC1523215.
29. Narasaraju, T. A., Chen, H., Weng, T., Bhaskaran, M., Jin, N., Chen, J. W., Chen, Z., Chinoy, M. and **Liu, L.** (2005) Expression profile of IGF system during lung injury and recovery in rats exposed to hyperoxia – a possible role of IGF-1 in alveolar epithelial cell proliferation and differentiation. *J. Cell Biochem.* 97:984-998.
30. Bhaskaran, M., Chen, H., Chen, Z. and **Liu, L.** (2005) Hemoglobin is expressed in alveolar epithelial type II cells. *Biochem. Biophys. Res Commun.* 333:1348-1352.
31. Maiti, S., Dutta, S. M., Baker, S. M., Zhang J., Narasaraju, T., **Liu, L.** and Chen, G. P. (2005) In vivo and In vitro oxidative regulation of rat aryl sulfotransferase IV (AST IV). *J. Biochem. Mol. Toxicol.* 19:109-118.
32. Chen, Z. and **Liu, L.** (2005) *RealSpot*: Software for annotating the quality of DNA microarray raw data and spot images. *Physiol Genomics.* 21:284-291
33. Gou*, D. M., Narasaraju*, T. A., Narendranath C. R., Jin, N., Wang, P. and **Liu, L.** (2004) Gene silencing in alveolar epithelial type II cells using cell-specific promoter *in vitro* and *in vivo*. *Nucleic. Acids Res*, 32:e134. PMID: PMC521678 (*co-first author).
34. Chen, Z., Jin, N., Narasaraju, T. A., Chen, J. W., McFarland L. R., Scott, M. and **Liu, L.** (2004) Identification of two novel markers for alveolar epithelial type I and type II cells. *Biochem. Biophys. Res. Commun.* 319: 774-780.
35. Abonyo, B., Gou, D. M., Wang, P., Narasaraju, T. A., Wang, Z. X. and **Liu, L.** (2004) Syntaxin 2 and SNAP-23 are required for regulated surfactant secretion. *Biochemistry*, 43: 3499-3506.
36. Chen, J. W., Chen, Z., Narasaraju, T. A., Jin, N. and **Liu, L.** (2004) Isolation of highly pure alveolar epithelial type I and type II cells from rat lungs. *Lab Invest.* 84:727-735. (This paper was selected as a key feature article for "Inside Lab Invest". see comment: <http://www.nature.com/cgi-taf/DynaPage.taf?file=/labinvest/journal/v84/n6/full/3700100a.html>)
37. Singh, T. K., Abonyo, B., Narasaraju T. and **Liu, L.** (2004) Reorganization of cytoskeleton in alveolar type II cells, a role of annexin II. *Cell. Signal.* 16:63-70.
38. Chattopadhyay, S., Sun, P., Wang, P., Abonyo, B., Cross, N. L. and **Liu, L.** (2003) Fusion of lamellar bodies with the plasma membrane is driven by the dual action of annexin II tetramer and arachidonic acid. *J. Biol. Chem.* 278:39675-39683.
39. Narasaraju, T. A., Jin, N., Chintagari, N. R., Chen, Z., Gou, D. M. and **Liu, L.** (2003) Protein nitration of rat lungs during hyperoxia, a possible role for myeloperoxidase. *Am. J. Physiol.* 285: L1037-L1045.

40. Gou, D. M., Jin, N. and **Liu, L.** (2003) Gene silencing in mammalian cells by PCR-based short hairpin RNA, *FEBS Lett.* 548:113-118.
41. Abonyo, B., Wang, P., Narasaraju T., Rowan, W. H., McMillian, D.H., Zimmerman, U.J. and **Liu, L.** (2003) Characterization of α -soluble N-ethylmaleimide-sensitive fusion attachment protein in alveolar type II cells: implications in lung surfactant secretion. *Am. J. Respir. Mol Cell Biol.* 29:273-282.